

1

UNIT

Overview

WARMING UP

PRACTICAL READING

INTENSIVE READING



Learning Objectives

After studying this unit, you will be able to:

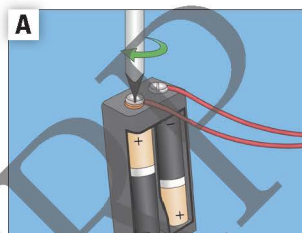
- have a general idea of the electricity grid and its five major parts
- understand the working mechanism of the GEIDCO
- develop a critical understanding of nuclear energy
- know the achievement of the artificial sun in China

EXTENSIVE READING

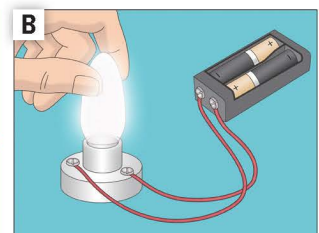
READING INTO CHINA

Warming Up

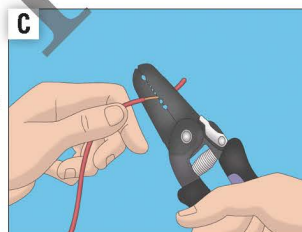
What is the procedure for making a simple electric circuit? Put the following steps in the right order.



A
Attach the wires to the battery pack.



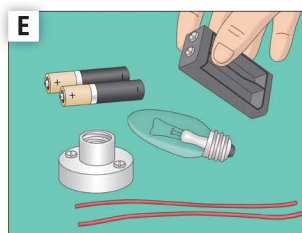
B
Test the circuit.



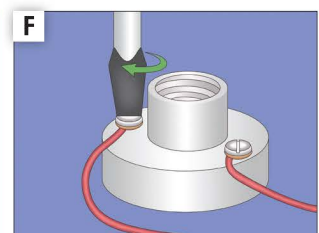
C
Strip the ends of the insulated wires.



D
Install the batteries in the battery pack.



E
Gather the necessary materials.

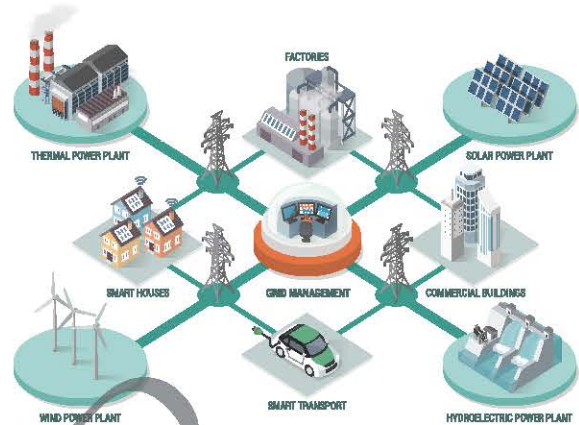


F
Fasten the other ends of the wires to the bulb holder.



What makes up an electricity grid?

An electricity grid is a complex and incredibly important system. It transmits power generated at a variety of facilities and distributes it to end users, often over long distances. It provides electricity for buildings, industrial facilities, schools and homes. And it does so every minute of every day, all year round. The electricity grid consists of five major parts, each of which is detailed below.



1 Power generation

A variety of facilities generate electricity, including thermal power plants, hydroelectric power plants, nuclear power plants, wind power plants and solar power plants. The locations of these electric generators and their distances from end users vary widely.



2 Power transmission

Transmission is an important part of the overall function of the power system. Through power transmission, electric energy can be transmitted to load centers far away from the power plants, so that the development and utilization of electricity can exceed geographical restrictions.



3 Power transformation

Power transformation is the process of transferring electricity through a transformer. A transformer is a device that changes the voltage by applying the principle of electromagnetic induction. Its main components are the primary coil, the secondary coil and the iron core (magnetic core).



4 Power distribution

Power distribution is the link that directly connects with end users and distributes electricity to end users in the power system. The distribution system consists of a distribution substation, high-voltage distribution lines, distribution transformers, low-voltage distribution lines, and corresponding control and protection equipment.



5 Power consumption

The electricity grid comes to an end when electricity finally gets to consumers, allowing us to turn on the lights, watch television, or run the dishwasher. The patterns of our lives add up to a varying demand for electricity by hour, day and season, which is why the management of the grid is complicated and vital for everyday life.

Task 1 Words Complete the following sentences with the words in the boxes.

transmission

electricity

distribution

components

grid

consumption

- 1 The plant will generate around 30 megawatts of electricity, which will be fed into the national _____.
- 2 The new plan focused on reducing carbon dioxide emissions by cutting energy _____.
- 3 They aimed to achieve a more equitable _____ of resources.
- 4 We rely on high-speed _____ of data.
- 5 The wind farm may be able to generate enough _____ for 2,000 homes.
- 6 Exercise is one of the key _____ of a healthy lifestyle.

Task 2 Reading comprehension Decide whether the following statements are true (T) or false (F).

- 1 Through power distribution, electric energy can be transmitted directly to load centers.
- 2 The locations of electric generators and their distances from end users can be very different between each of them.
- 3 The principle of electromagnetic induction is used to change the voltage in power transformation.
- 4 Power generation is the link that directly connects with consumers.
- 5 An electricity grid, working on and off, provides electricity for buildings, industrial facilities, schools and homes.

Words & Phrases

Words

coil /kɔɪl/ *n.* (电路的) 线圈, 绕组
 complex /kəm'pleks/ *adj.* 复杂的
 component /kəm'pəʊnənt/ *n.* 组成部分
 consumption /kən'sʌmpʃən/ *n.* 消费, 消耗量
 control /kən'trəʊl/ *n.* 控制装置
 distribution /dɪstrə'bju:ʃən/ *n.* 分发, 分配
 generation /dʒenə'reɪʃən/ *n.* 产生
 grid /grɪd/ *n.* 电力网, 输电网
 magnetic /mæɡ'nɛtɪk/ *adj.* 磁的, 磁性的
 main /meɪn/ *adj.* 最大的, 最重要的
n. 主管道, 干线电缆
 substation /'sʌb,steɪʃən/ *n.* 变电站, 配电室
 transformation /trænsfɔ:'meɪʃən/ *n.* 改变
 transformer /træns'fɔ:rmər/ *n.* 变压器
 transmission /træns'mɪʃən/ *n.* 传输, 发送
 utilization /,ju:tələ'zeɪʃən/ *n.* 利用, 使用
 vital /'vaɪtəl/ *adj.* 极其重要的, 必不可少的
 voltage /'vəʊltɪdʒ/ *n.* 电压

Phrases

a variety of sth 各种各样的某事物
 distribution transformer 配电变压器
 electromagnetic induction 电磁感应
 end user 终端用户
 iron core 铁芯
 load center 负荷中心
 magnetic core 磁芯
 power plant 发电厂



Global Energy Interconnection

- ¹ On September 26, 2015, China proposed discussions on establishing Global Energy Interconnection (GEI), to **facilitate** efforts to meet the global power demand with clean and green **alternatives** at the United Nations Sustainable Development Summit.
- ² At the Belt and Road Forum for International Cooperation on May 14, 2017, China called for collective action to seize opportunities presented by the change of energy mix and the revolution in energy technologies to develop GEI and achieve green and low-carbon development.
- ³ The Global Energy Interconnection Development and Cooperation Organization (GEIDCO), which has its headquarters in Beijing, China, is a non-governmental and non-profit organization among firms, associations, institutions and individuals who are dedicated to promoting the sustainable development of energy worldwide.
- ⁴ The purpose of the GEIDCO is to promote the establishment of a GEI system, to meet the global demand for electricity in a clean and green way, to **implement** the United Nations Sustainable Energy for All and climate change initiatives, and to serve the sustainable development of humanity.
- ⁵ The GEIDCO will popularize the concept of GEI, **formulate** GEI development plans, promote the creation of a GEI technical standards **framework**, organize **concerted** and collaborative efforts in researches and innovations, key studies,



international communication and cooperation, and engineering project implementation, provide consulting services, and lead the development of GEI.

- 6 The founding of the GEIDCO marks the transition of GEI from a concept to strategy implementation. Looking forward, GEI will promote South-South and South-North cooperation, and help transform the resource advantage into an economic advantage in regions like Asia, Africa and South America. This will help **address** power shortage and poverty while narrowing regional gaps and differences. Life will be better as the world gradually turns into a bright, peaceful and harmonious global village with **sufficient** energy, blue sky and green land.

Words & Phrases

Words

address /ə'dres/ *v.* 解决, 处理
alternative /ɔ:ltə'nə:tɪv/ *n.* 可供选择的事物
concerted /kən'sɜ:tɪd/ *adj.* 一致的
facilitate /fə'sɪlɪteɪt/ *v.* 促进, 使便利
formulate /'fɔ:mjəleɪt/ *v.* 规划, 制定
framework /'freɪmwɜ:k/ *n.* 体系, 框架
implement /'ɪmplənt/ *v.* 执行, 实施
sufficient /sə'fɪʃənt/ *adj.* 足够的, 充足的

Phrases

energy mix 能源结构
power shortage 电力短缺
regional gap 区域差距
sustainable development 可持续发展

Notes

1. Global Energy Interconnection (GEI): 全球能源互联网。它是清洁主导、电为中心、互联互通、共建共享的现代能源体系, 是清洁能源在全球范围大规模开发、输送、使用的重要平台, 其实质是“智能电网+特高压电网+清洁能源”。
2. Global Energy Interconnection Development and Cooperation Organization (GEIDCO): 全球能源互联网发展合作组织。该组织致力于推动世界能源可持续发展, 宗旨是推动构建全球能源互联网, 以清洁和绿色方式满足全球电力需求, 推动实现联合国“人人享有可持续能源”倡议和应对气候变化目标, 服务人类社会可持续发展。
3. non-governmental and non-profit organization: 非政府及非营利组织。它是指不以营利为目的、主要从事各种志愿性的公益或互益活动的非官方机构。
4. Sustainable Energy for All: “人人享有可持续能源”倡议。2011年, 由时任联合国秘书长潘基文发起。

Intensive Reading

Task 1 Discussion Work in groups and answer the following questions.

- 1 How much do you know about the Belt and Road Initiative? How does it influence you or your life? Use one example to illustrate your point.
- 2 What does green energy mean? How does it work? Can you name a few advantages of it?

Task 2 Words Fill in the blanks with the correct form of the words in the boxes.

forum

facilitate

framework

formulate

found

- 1 He opposed the _____ of the gallery.
- 2 The new airport will _____ the development of tourism.
- 3 The report provides a _____ for further research.
- 4 The association began as a _____ for sharing ideas about management problems.
- 5 I was impressed by the way he could _____ his ideas.

Grammar Notes

- 英语中有大量的名词是以 -tion 结尾的, 其中绝大多数是在动词后加 -ion、-tion 等派生词缀而成。
- 一般以 -te 结尾的动词变名词时, 需要去 e 加 -ion。

例词:

act—action

collect—collection

decorate—decoration

educate—education

Task 3 Grammar Change the following nouns into their verb forms.

Nouns

- 1 cooperation
- 2 election
- 3 organization
- 4 association
- 5 implementation
- 6 institution
- 7 creation
- 8 innovation
- 9 communication
- 10 transition

Verbs

Task 4 Reading comprehension Tick the correct descriptions of the GEIDCO according to the text. Then try to write an introduction to the GEIDCO.

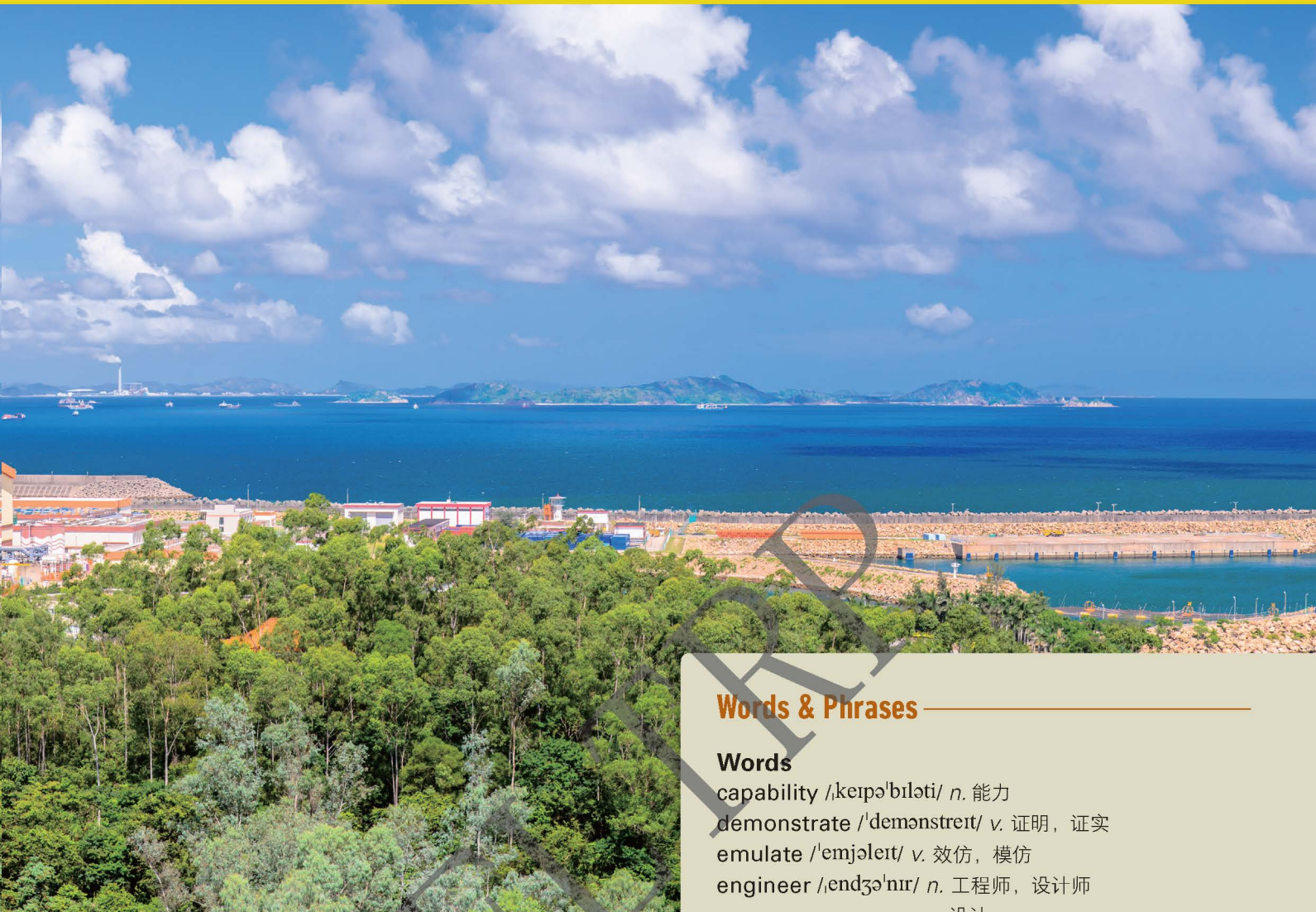
- 1 The GEIDCO was founded in China with its headquarters in Shanghai.
- 2 The GEIDCO is a non-governmental and non-profit organization with its headquarters in Beijing, China.
- 3 The GEIDCO aims to promote the sustainable economic and financial development worldwide.
- 4 The GEIDCO is dedicated to improving the sustainable green and low-carbon development all around the world.
- 5 The only purpose of the GEIDCO is to promote the concept of GEI and make it known to all.
- 6 The aims of the GEIDCO are to popularize the concept of GEI, formulate GEI development plans and finally lead the development of GEI.
- 7 The GEIDCO serves the sustainable development of energy as well as humanity.
- 8 The GEIDCO is expected to promote South-South and South-North cooperation.
- 9 The GEIDCO is to help solve problems like power shortage or worldwide poverty.
- 10 With the development of the GEIDCO, regional gaps will be narrowed down.

An introduction to the GEIDCO

Fusion



- ¹ Fusion powers the universe. Every one of the stars in the sky uses fusion to generate enormous amounts of energy. Why shouldn't we? For years, scientists, engineers, and policymakers have worked to emulate nature and use fusion to solve our energy problems.
- ² Nuclear fusion, once industrialized, will tremendously increase the amount of energy available to humans. As the world's needs for power continue to grow, fusion could provide an invaluable, low-carbon source of electricity. In the long run, it would be able to supply the majority of our energy.
- ³ Fusion is an attractive, sustainable solution to
- humanity's energy problems. Fusion fuel has the highest energy density of any demonstrated source, meaning it tends to be cheap to gather and easy to transport. Moreover, compared to renewable energy power plants like wind or solar farms, a fusion power plant would take up minimal space. There are practically limitless fuel reserves for fusion here on earth and elsewhere in the universe. These reserves are readily available and can be used on demand. For these reasons, fusion will be an invaluable tool in the future and the first fusion power plant can be seen as a milestone in human history.
- ⁴ Fusion is a massively complex problem that requires significant upfront investment. For a



society, to get to the point where it can build a fusion power plant is important. It requires the construction of increasingly intricate and expensive experimental devices, an industrial capability to engineer and manufacture complex components, and the political will to sustain a massive long-term research effort.

- 5 Fusion brings the world together. The international feature of fusion is becoming stronger and stronger. Working together to develop technology strengthens ties between countries and is a strong drive of global peace and stability.

Words & Phrases

Words

capability /ˌkeɪpəˈbɪləti/ *n.* 能力

demonstrate /ˈdemənstreɪt/ *v.* 证明, 证实

emulate /ˈemjələɪt/ *v.* 效仿, 模仿

engineer /ˌendʒɪˈnɪr/ *n.* 工程师, 设计师
v. 设计

fusion /ˈfjuːʒən/ *n.* (核) 聚变

intricate /ˈɪntrɪkət/ *adj.* 错综复杂的

massive /ˈmæsɪv/ *adj.* 巨大的

milestone /ˈmaɪlstəʊn/ *n.* 重大事件, 里程碑

minimal /ˈmɪnɪməl/ *adj.* 极小的, 极少的

renewable /rɪˈnuːəbəl/ *adj.* (能源) 可更新的, 可再生的

sustain /səˈsteɪn/ *v.* 保持, 维持

Phrases

fuel reserve 燃料储备

on demand 一经要求

upfront investment 前期投资

Note

energy density: 能量密度。它是指在一定的空间或质量物质中储存能量的大小, 即单位体积里所含的能量。能量密度的单位一般为焦耳 / 立方米、千焦 / 立方米或兆焦 / 立方米。

Extensive Reading

Task 1 Reading comprehension Ten features of fusion power are given below. Choose those mentioned in the text. Then put them into the corresponding boxes.

① cheap to gather

② abundant in reserves

③ space-saving

④ high-level safety requirements

⑤ dependent on political will

⑥ difficult for plant location

⑦ hard to handle radioactive waste

⑧ costly in research

⑨ clean and low-carbon

⑩ easy to transport

Features mentioned in the text

Advantages

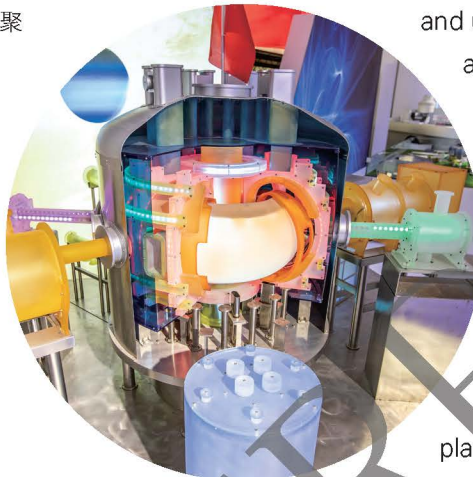
Disadvantages

Task 2 Writing Discuss your understanding of the following topic in groups. After the discussion, write a short essay of around 200 words on the topic.

Some people say, "Fusion is 20 years away and it will always be."

China's "artificial sun"

Independently designed and developed by China, the Experimental Advanced Superconducting Tokamak (EAST) (全超导托卡马克核聚变实验装置), or China's "artificial sun", is the world's first fully superconducting tokamak with a non-circular cross-section and the country's 4th generation experimental nuclear fusion device. It achieved a continuous high-temperature plasma operation for 1,056 seconds in an experiment carried out in January 2022, the longest-lasting operation of its kind in the world. This breakthrough puts China



one step ahead in the global race to harness a new, artificial kind of solar energy for clean and unlimited energy. A tokamak is a device which uses a powerful magnetic field to confine plasma in a hollow, doughnut-shaped container. It is one of the several types of magnetic confinement devices (磁约束装置) being developed to produce controlled thermonuclear fusion power. It produces the highest plasma temperatures, densities and confinement duration of any confinement devices.

I know the main components of an electricity grid include...

I know the purpose of the GEIDCO is to...

I know the reasons why fusion is a solution to energy problems are...

I know the tokamak is a device to...

My Learning Log